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AERIAL DISPERSION OF SPIDERS IN NORTH CENTRAL TEXAS[1]

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ABSTRACT

In a 365 day period 3400 ballooning spiders belonging to 14 families were collected in a suction trap. The four most common ballooning families were Erigonidae, Thomisidae, Oxyopidae, and Tetragnathidae. These four families make of 77% of the total. Peak periods of spider aerial dispersal occurred during early spring through early summer and late summer through fall. No information could be found on the ballooning activity of the family Mimetidae before this study. All thirteen other families had been reported previously.

INTRODUCTION

This study was designed to establish dispersion trends of families of spiders by month in North Central Texas. Several accounts of aerial dispersion (ballooning) are reported in the literature. The first was by Martin Lister in 1678 in his *Historiae Animalium Angliae* (see Crosby and Bishop, 1936). John Blackwall (1827) was the first to give an accurate account. McCook (1877, 1878), Emerton (1908) and Bristowe (1929) followed these early workers in publishing observations on spider ballooning. Duffey (1956) made one of the most extensive studies of aeronautic behavior of spider populations and related it to microclimatic conditions.

Most ballooning spiders are in early instars, second through fourth (van Wingerden and Vugts, 1974 and Horner, 1975). However, many adult spiders have been known to balloon, especially those in the families Linyphiidae and Erigonidae. The members of these two families are very small and this may account for their ballooning ability. Size is obviously one of the major restrictions to ballooning.

MATERIALS AND METHODS

Ballooning was studied by collecting the spiders in a Johnson-Taylor suction trap. The trap is 2.5 m tall, 55.8 cm in diameter, barrel shaped and has a fine mesh funnel screen

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terminating in a one pint jar of 70% ethyl alcohol. Air is pulled into the trap from several feet around the opening by a 0.33 h.p. electric motor driven fan.

The trap was located on the roof of the Science Building at Midwestern State University, Wichita Falls, Texas. The height of the roof of the building is 13.6 m above ground level. The surrounding area is made up of paved streets, buildings, parking lots, houses, grass lawns, and landscaped trees and shrubs. There is a small lake and pecan orchard approximately one kilometer southwest of the building. Primary original vegetation includes grasses and mesquite.

This study began on 10 June 1974 and concluded 9 June 1975. The specimens collected in June of the two years are grouped together as one month. The trap was run continuously for the year. Collections were made daily. Specimens were identified only to family. The large number of specimens collected, the great number of immature specimens, and lack of proper keys to the immatures made it impractical to key specimens to species.

RESULTS AND DISCUSSION

During the year 3400 specimens representing 14 families were collected. Representation ranged from one member of the family Mimetidae to 981 of the family Erigonidae. Two immature and partially damaged specimens, possibly of the family Erigonidae, remain unidentified.

Seasonal Dispersion.—The present study suggests that most spider families show two yearly peaks of aerial activity: one in late spring to early summer, and a second between mid-summer and fall. Only 57 of 3400 spiders were collected in January, February, and March (Table 1). These months are the coldest part of the year and low temperatures doubtless account for the low numbers of spiders taken.

Three percent of the total of 3400 spiders were collected in April. Nine of 14 families were represented. Sixty of the 110 spiders caught were erigonids (Table 1).

May was the first month that heavy ballooning could be observed, with 539 specimens collected. Taken in May were 315 erigonids, 170 tetragnathids, 14 linyphiids, and 99 specimens of other families (Table 1).

June collections contained representatives of 13 families, more than any other month. Only the Clubionidae were not represented. June collections also yielded the second largest number of spiders, 607, or 18% of the total. Families with their highest peaks in June were Theridiidae (21 of 39), Lycosidae (38 of 149), Araneidae (75 or 190), and Anyphaenidae (7 of 27).

The largest number of Salticidae (47 of 254 and Dictynidae (4 of 24) were collected in July. Of the 3400 spiders, 2854 or 84% of the total were caught from May through October. These six months include the peak periods of aerial activity for every family except Gnaphosidae. Of the 2865 spiders taken from May through October only 239 (7%) were taken in July and 198 (6%) in August. The highest daily temperatures for North Central Texas are usually recorded in July and August. The only family whose representation increased during July and August was the Dictynidae with eight collected in July and seven in August.

More specimens (667) were taken in September than in any other month (Table 1). Weather conditions are usually mild at this time. The only real peak of the year for the oxyopids occurred in September when 239 of 568 were taken. Active dispersal of nearly every family took place in September, even if an early summer peak had occurred.

Table 1.–Summary of spiders ballooning by month, including the total number of each family.

Family	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Erigonidae	27	1	12	60	315	159	23	62	120	83	104	15	981(29%)
Thomisidae	2	2	3	9	13	61	69	35	124	187	81	4	590(17%)
Oxyopidae	1	-	-	2	4	76	18	8	239	151	67	2	568(17%)
Tetragnathidae	2	-	-	11	170	105	12	7	76	46	37	16	482(14%)
Salticidae	1	-	2	13	10	47	96	34	20	26	2	3	254(8%)
Araneidae	-	1	-	4	37	75	4	4	34	23	6	2	190(6%)
Lycosidae	-	-	-	2	29	38	2	23	26	22	6	1	149(4%)
Linyphiidae	-	1	1	7	15	12	1	2	14	12	10	4	79(2%)
Theridiidae	-	-	-	-	-	21	3	10	4	1	-	-	39(1%)
Anyphaenidae	-	-	-	-	3	7	2	4	4	3	4	-	27(<1%)
Dictynidae	-	-	-	-	1	4	8	7	4	-	-	-	24(<1%)
Gnaphosidae	-	-	-	2	2	1	-	2	-	-	4	-	11(<1%)
Clubionidae	-	-	-	-	-	-	-	-	2	1	-	-	3(<1%)
Mimetidae	-	-	-	-	-	1	-	-	-	-	-	-	1(<1%)
Unknown	-	-	1	-	-	-	1	-	-	-	-	-	2(<1%)
Monthly Total	33	5	19	110	599	607	239	198	667	555	321	47	3400

October was a month of high activity with 16% (555) of the total number of spiders taken then. Most families showed a slight decrease from September. The Thomisidae, an exception, were most active during this month and 187 were captured.

Marked decrease in ballooning activity occurred in November and December, when only 321 and 47 spiders were caught. The gnaphosids alone showed increased ballooning activity during November when four individuals were taken.

Family Dispersion.—Family taxonomy is essentially that of Kaston (1972).

Erigonidae (Micryphantidae).—The erigonids were the most common spiders taken in the suction trap (981 of 3400). This group and the Thomisidae were the only families taken every month of the year. Peak ballooning was in May with 315 taken. A second and much smaller peak occurred from September through November. The erigonids included many more adult ballooners than the other groups. This probably accounts for the large number caught, since both mature and immature erigonids commonly balloon.

Thomisidae.—The thomisids were the second most common spider captured (590 of 3400). Rather than the two distinct ballooning peaks that most spiders exhibit, thomisids shows one peak from April to November, with a drop in activity in the month of August. From September through November 392 crab spiders were taken, with 187 in October alone.

Oxyopidae.—A total of 568 lynx spiders was taken in the trap. The family is the third most common ballooner in North Central Texas. Ballooning activity of the oxyopids showed one of the most dramatic seasonal changes. Eight individuals were taken in August, versus 239 in September and 151 in October.

Tetragnathidae.—The greatest ballooning activity by the tetragnathids occurred in May (170) and June (105). An increase in activity again occurred in September (76) and October (46). Tetragnathids balloon year-round except February and March. This was the fourth most common ballooning family.

Salticidae.—The salticids taken numbered 254. The highest ballooning activity was from June to October. A definite peak in activity occurred in July, with 96 spiders taken then.

Araneidae.—The araneids are year-round ballooners. As most other families, they have two peak periods, one in early summer and the other in early fall. Except during these peak periods, the numbers that balloon seem to be relatively consistent throughout the rest of the year.

Lycosidae.—As in most families, two peaks in ballooning activity were shown. A total of 149 specimens was recorded. The first and largest peak is in May (29) and June (38). The second peak occurred in August (23), September (26), and October (22). Lycosids balloon rarely between November and April, and only nine were taken in these six months.

Linyphiidae.—Only 79 linyphiids were captured. Members of this family apparently balloon year-round. Their major ballooning period was September to November.

Theridiidae.—The 39 theridiids captured were taken from June through October (Table 1). One half of the specimens were taken in June.

Anyphaenidae.—Twenty-seven anyphaenids were captured during the year. June marked the highest point of activity when seven were caught. None were taken from December through April.

Dictynidae.—The dictynids are not common ballooners in the North Central Texas area at any time of the year. Only 24 dictynids were taken from May through September.

There is apparently a single midsummer peak in July and August. The Dictynidae is the only family to show this pattern.

Gnaphosidae.–The gnaphosids were not consistent with the general trends shown in other families. This is probably due to the small sample size (Table 1). Glick (1939) reported that gnaphosids were taken in aerial samples. His study and the present one are the only records of their dispersion known to us.

Clubionidae.–Only three clubionids were caught. Of the three, two were taken in September and one in October. According to Peck and Whitcomb (1970), the largest number of young *Chiracanthium* are found between August and September.

Mimetidae.–Only one mimetid was taken during the study. This is the only family of spiders found in this study (so far as we are aware) that had not previously been reported to balloon. The immature specimen was taken in June, the month of heaviest ballooning dispersal.

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